INTEGRATED SCIENCE 2

CALIFORNIA CONTENT STANDARDS: BIOLOGY/LIFE SCIENCES	2003 Blueprint	%
Cell Biology	**5**	**8.3%**
1. The fundamental life processes of plants and animals depend on a variety of chemical reactions that occur in specialized areas of the organism's cells. As a basis for understanding this concept:		
a. *Students know* cells are enclosed within semipermeable membranes that regulate their interaction with their surroundings.	✓	
c. *Students know* how prokaryotic cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure.	✓	
d. *Students know* the central dogma of molecular biology outlines the flow of information from transcription of ribonucleic acid (RNA) in the nucleus to translation of proteins on ribosomes in the cytoplasm.	✓	
e. *Students know* the role of the endoplasmic reticulum and Golgi apparatus in the secretion of proteins.	✓	
h. *Students know* most macromolecules (polysaccharides, nucleic acids, proteins, lipids) in cells and organisms are synthesized from a small collection of simple precursors.	✓	
j.* *Students know* how eukaryotic cells are given shape and internal organization by a cytoskeleton or cell wall or both.	NA*	
Genetics	**10**	**16.7%**
2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:		
a. *Students know* meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce gametes containing one chromosome of each type.	✓	
b. *Students know* only certain cells in a multicellular organism undergo meiosis.	✓	
c. *Students know* how random chromosome segregation explains the probability that a particular allele will be in a gamete.	✓	
e. *Students know* why approximately half of an individual's DNA sequence comes from each parent.	✓	
f. *Students know* the role of chromosomes in determining an individual's sex.	✓	
g. *Students know* how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents.	✓	
3. A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization. As a basis for understanding this concept:		
a. *Students know* how to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive).	✓	
b. *Students know* the genetic basis for Mendel's laws of segregation and independent assortment.	✓	
c.* *Students know* how to predict the probable mode of inheritance from a pedigree diagram showing phenotypes.	NA*	
d.* *Students know* how to use data on frequency of recombination at meiosis to estimate genetic distances between loci and to interpret genetic maps of chromosomes.	NA*	
4. Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism. As a basis for understanding this concept:		
a. *Students know* the general pathway by which ribosomes synthesize proteins, using tRNAs to translate genetic information in mRNA.	✓	
b. *Students know* how to apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA.	✓	
TOTAL in Biology/Life Sciences	**15**	**25.0%**

*Not assessed

INTEGRATED SCIENCE 2

CALIFORNIA CONTENT STANDARDS: CHEMISTRY	2003 Blueprint	%
Conservation of Matter and Stoichiometry	**2**	**3.3%**
3. The conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants. As a basis for understanding this concept:		
a. *Students know* how to describe chemical reactions by writing balanced equations.	✓	
Solutions	**2**	**3.3%**
6. Solutions are homogenous mixtures of two or more substances. As a basis for understanding this concept:		
a. *Students know* the definitions of *solute* and *solvent*.	✓	
b. *Students know* how to describe the dissolving process at the molecular level by using the concept of random molecular motion.	✓	
c. *Students know* temperature, pressure, and surface area affect the dissolving process.	✓	
f.* *Students know* how molecules in a solution are separated or purified by the methods of chromatography and distillation.	NA*	
Organic Chemistry and Biochemistry	**2**	**3.3%**
10. The bonding characteristics of carbon allow the formation of many different organic molecules of varied sizes, shapes, and chemical properties and provide the biochemical basis of life. As a basis for understanding this concept:		
a. *Students know* large molecules (polymers), such as proteins, nucleic acids, and starch, are formed by repetitive combinations of simple subunits.	✓	
b. *Students know* the bonding characteristics of carbon that result in the formation of a large variety of structures ranging from simple hydrocarbons to complex polymers and biological molecules.	✓	
c. *Students know* amino acids are the building blocks of proteins.	✓	
d.* *Students know* the system for naming the ten simplest linear hydrocarbons and isomers that contain single bonds, simple hydrocarbons with double and triple bonds, and simple molecules that contain a benzene ring.	NA*	
e.* *Students know* how to identify the functional groups that form the basis of alcohols, ketones, ethers, amines, esters, aldehydes, and organic acids.	NA*	
f.* *Students know* the R-group structure of amino acids and know how they combine to form the polypeptide backbone structure of proteins.	NA*	
TOTAL in Chemistry	**6**	**10%**

*Not assessed

INTEGRATED SCIENCE 2

CALIFORNIA CONTENT STANDARDS: EARTH SCIENCES	2003 Blueprint	%
Earth's Place in the Universe	**4**	**6.7%**
1. Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time. As a basis for understanding this concept:		
a. *Students know* how the differences and similarities among the sun, the terrestrial planets, and the gas planets may have been established during the formation of the solar system.	✓	
c. *Students know* the evidence from geological studies of Earth and other planets suggest that the early Earth was very different from Earth today.	✓	
f. *Students know* the evidence for the dramatic effects that asteroid impacts have had in shaping the surface of planets and their moons and in mass extinctions of life on Earth.	✓	
g.* *Students know* the evidence for the existence of planets orbiting other stars.	NA*	
Energy in the Earth System	**11**	**18.3%**
4. Energy enters the Earth system primarily as solar radiation and eventually escapes as heat. As a basis for understanding this concept:		
b. *Students know* the fate of incoming solar radiation in terms of reflection, absorption, and photosynthesis.	✓	
5. Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents. As a basis for understanding this concept:		
a. *Students know* how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat.	✓	
b. *Students know* the relationship between the rotation of Earth and the circular motions of ocean currents and air in pressure centers.	✓	
c. *Students know* the origin and effects of temperature inversions.	✓	
e. *Students know* rain forests and deserts on Earth are distributed in bands at specific latitudes.	✓	
f.* *Students know* the interaction of wind patterns, ocean currents, and mountain ranges results in the global pattern of latitudinal bands of rain forests and deserts.	NA*	
g.* *Students know* features of the ENSO (El Niño southern oscillation) cycle in terms of sea-surface and air temperature variations across the Pacific and some climatic results of this cycle.	NA*	
6. Climate is the long-term average of a region's weather and depends on many factors. As a basis for understanding this concept:		
a. *Students know* weather (in the short run) and climate (in the long run) involve the transfer of energy into and out of the atmosphere.	✓	
b. *Students know* the effects on climate of latitude, elevation, topography, and proximity to large bodies of water and cold or warm ocean currents.	✓	
c. *Students know* how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors, such as solar radiation and plate movement.	✓	
d.* *Students know* how computer models are used to predict the effects of the increase in greenhouse gases on climate for the planet as a whole and for specific regions.	NA*	
TOTAL in Earth Sciences	**15**	**25.0%**

*Not assessed

INTEGRATED SCIENCE 2

CALIFORNIA CONTENT STANDARDS: PHYSICS	2003 Blueprint	%
Motion and Forces	**11**	**18.3%**
1. Newton's laws predict the motion of most objects. As a basis for understanding this concept:		
a. *Students know* how to solve problems that involve constant speed and average speed.	✓	
b. *Students know* that when forces are balanced, no acceleration occurs; thus an object continues to move at a constant speed or stays at rest (Newton's first law).	✓	
c. *Students know* how to apply the law $F=ma$ to solve one-dimensional motion problems that involve constant forces (Newton's second law).	✓	
d. *Students know* that when one object exerts a force on a second object, the second object always exerts a force of equal magnitude and in the opposite direction (Newton's third law).	✓	
e. *Students know* the relationship between the universal law of gravitation and the effect of gravity on an object at the surface of Earth.	✓	
f. *Students know* applying a force to an object perpendicular to the direction of its motion causes the object to change direction but not speed (e.g., Earth's gravitational force causes a satellite in a circular orbit to change direction but not speed).	✓	
h.* *Students know* Newton's laws are not exact but provide very good approximations unless an object is moving close to the speed of light or is small enough that quantum effects are important.	NA*	
l.* *Students know* how to solve problems in circular motion by using the formula for centripetal acceleration in the following form: $a = v^2/r$.	NA*	
Conservation of Energy and Momentum	**7**	**11.7%**
2. The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects. As a basis for understanding this concept:		
a. *Students know* how to calculate kinetic energy by using the formula $E=(1/2)mv^2$.	✓	
b. *Students know* how to calculate changes in gravitational potential energy near Earth by using the formula (change in potential energy) = mgh (h is the change in the elevation).	✓	
c. *Students know* how to solve problems involving conservation of energy in simple systems, such as falling objects.	✓	
d. *Students know* how to calculate momentum as the product mv.	✓	
TOTAL in Physics	**18**	**30.0%**

*Not assessed

INTEGRATED SCIENCE 2

CALIFORNIA CONTENT STANDARDS	2003 Blueprint	%
Investigation and Experimentation	**6**	**10.0%**
1. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop their own questions and perform investigations. Students will:		
a. Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.	✓	
b. Identify and communicate sources of unavoidable experimental error.	✓	
c. Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.	✓	
d. Formulate explanations by using logic and evidence.	✓	
e. Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.	✓	
f. Distinguish between hypothesis and theory as scientific terms.	✓	
g. Recognize the usefulness and limitations of models and theories as scientific representations of reality.	✓	
h. Read and interpret topographic and geologic maps.	✓	
i. Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena (e.g., relative ages of rocks, locations of planets over time, and succession of species in an ecosystem).	✓	
j. Recognize the issues of statistical variability and the need for controlled tests.	✓	
k. Recognize the cumulative nature of scientific evidence.	✓	
l. Analyze situations and solve problems that require combining and applying concepts from more than one area of science.	✓	
m. Investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings. Examples of issues include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources, and land and water use decisions in California.	✓	
n. Know that when an observation does not agree with an accepted scientific theory, the observation is sometimes mistaken or fraudulent (e.g., the Piltdown Man fossil or unidentified flying objects) and that the theory is sometimes wrong (e.g., the Ptolemaic model of the movement of the Sun, Moon, and planets).	✓	
TOTAL	**60**	**100%**

*Not assessed